30'

45'

28°15' -00'

28°00

45'

81°15'



The intermediate aquifer system within the Southwest Florida Water Management District underlies a 5,000-mi2 area including De Soto, Sarasota, Hardee, Manatee, and parts of Charlotte, Hillsborough, Highlands, and Polk Counties. It is overlain by the surficial aquifer system and is underlain by the Floridan aquifer system. The intermediate aquifer system consists of layers of sand, shell, clay, calcareous clays, limestone, and dolomite of the Tamiami Formation and Hawthorn Group of late Tertiary age. The aquifer system contains one or more water-bearing units separated by discontinuous confining units. This aquifer system is the principal source of potable water in the southwestern part of the study area and is widely used as a source of water in other areas where wells are open to the intermediate aquifer system or to both the intermediate and Floridan aquifer systems. Yields of individual wells open to the intermediate aquifer system vary from a few gallons to several hundred gallons per minute. The volume of water withdrawn from the intermediate aquifer system is considerably less than that withdrawn from the Floridan aquifer system in the study area (Duerr and others, 1988).

In areas where multiple aquifers exist in the system, wells open to all aquifers were selected for water-level measurements whenever possible. The water levels along the northern boundary of the intermediate aquifer system generally are similar to water levels in the underlying Floridan aquifer system because the confining unit that separates the two aquifers is either absent or discantinuous in that area, permitting direct hydraulic connection between the two aquifer systems. In the southwestern and lower coastal region of the study area, two aquifers and intervening confining units are present in the intermediate aquifer system (Wolansky, 1983): the Tamiami-upper Hawthorn aquifer and the underlying lower Hawthorn-upper Tampa aquifer. Lateral boundaries for the Tamiami-upper Hawthorn aquifer are undetermined because of limited hydrogeologic data available from wells. The potentiometric surface of the Tamiami-upper Hawthorn aquifer, where is known to exist, is shown separately from the potentiometric surface of the intermediate aquifer system.

The purpose of this report is to show the potentiometric surfaces of the intermediate aquifer system in September 1991. The potentiometric surface represents the level to which water will rise in tightly cased wells that tap a confined aquifer system. The surface is mapped by determining the altitude of water levels in a network of wells and is represented on maps by contours that connect points of equal altitude. This map shows water-level conditions near the end of the summer rainy season when ground-water withdrawals are usually low and the potentiometric surface is near its highest level for the year. The cumulative rainfall for the study area was 0.98 in. above normal for the period from September 1990 to September 1991 (Southwest Florida Water Management District, 1991).

Management District, 1991).

This report, prepared by the U.S. Geological Survey in cooperation with the Southwest Florida Water Management District, is one of a series of intermediate aquifer system potentiometric—surface map reports made for the study area since September 1985 based on synoptic measurements by the U.S. Geological Survey in cooperation with the Southwest Florida Water Management District. Water—level data are collected in May and September to depict the annual low and high water—level conditions, respectively. Most of the water—level data for this map were collected by the U.S. Geological Survey during the period of September 9–13, 1991. Supplemental data were collected by other agencies and companies.

SUMMARY OF HYDROGEOLOGIC CONDITIONS

The composite potentiometric surface of all water-bearing units within the intermediate aquifer system is shown in figure 1. The potentiometric surface of the Tamiami-upper Hawthorn aquifer is shown in figure 2; water levels are from wells drilled and open exclusively to this aquifer. The hydrographs for selected wells, shown in figure 3, indicate that the annual and seasonal fluctuations of the water levels are generally large in the central interior region where water demand for irrigation is high during fall and spring (hydrographs 2, 4, 5, and 9). Changes are smaller in the northern recharge area (hydrographs 1 and 3) and in coastal areas (hydrographs 7 and 8) where water use is predominantly for public supply. Hydrographs in figure 4 show the maximum daily water-level altitudes in selected wells from September 1990 to September 1991.

Water levels measured in September 1991 for the composite intermediate aquifer potentiometric surface were higher than those measured in May 1991 (Mularoni, 1992). In 139 wells with paired measurements, the September 1991 level ranged from 4.80 ft below to 36.37 ft above the May 1991 level and averaged 8.54 ft above the May level. In 33 wells in the Tamiami-upper Hawthorn aquifer with paired measurements, the September 1991 level ranged from 6.21 ft below to 15.70 ft above the May 1991 level and averaged 4.01 ft above the May level.

September 1991 water levels for the composite intermediate aquifer potentiometric surface generally were higher than those reported for September 1990 (Mularoni, and Knochenmus, 1991). In 138 wells with paired measurements, the September 1991 level ranged from 6.20 ft below to 26.34 ft above the September 1990 level and averaged 3.80 ft above the September 1990 level. In 34 wells in the Tamiami—upper Hawthorn aquifer with paired measurements, the September 1991 level ranged from 9.04 ft below to 6.94 ft above the September 1990 level. A cone of depression in the potentiometric surface of the composite intermediate aquifer system in western Lee County is evident at a well field that supplies Pine Island (fig. 1). A cone of depression that extends below sea level is evident in the potentiometric surface of the Tamiami—upper Hawthorn aquifer in northern Lee County at a well field that supplies Cape Coral (fig. 2). A cone of depression also exists in both of the aquifers at warm Mineral Springs, which is a natural discharge point from the intermediate aquifer system (figs.

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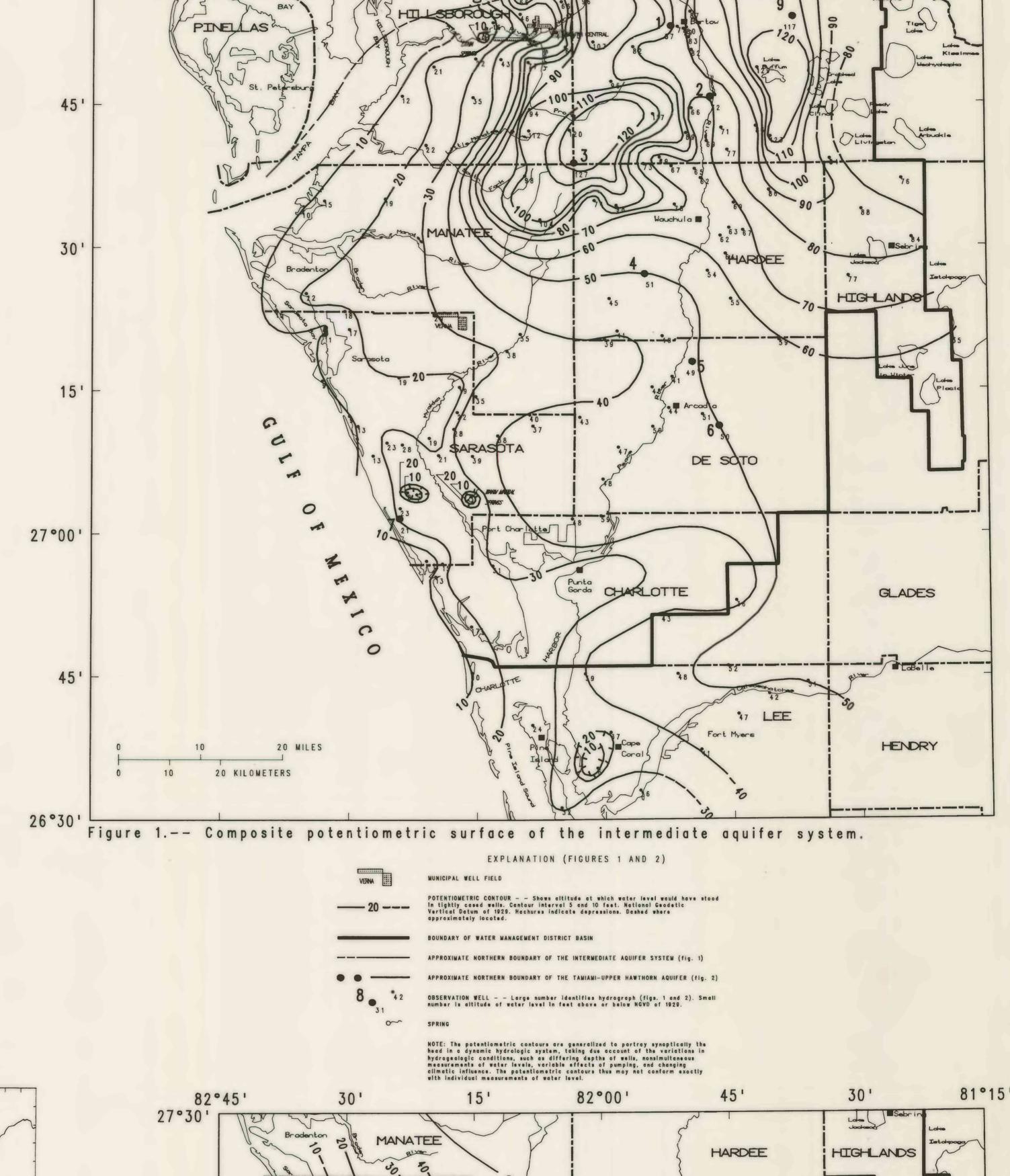
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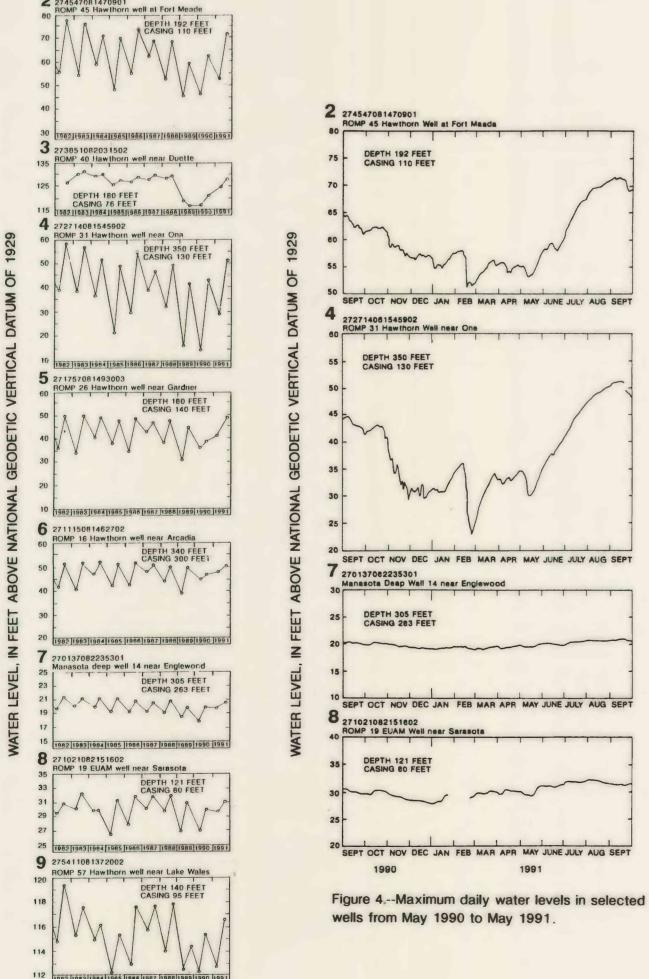
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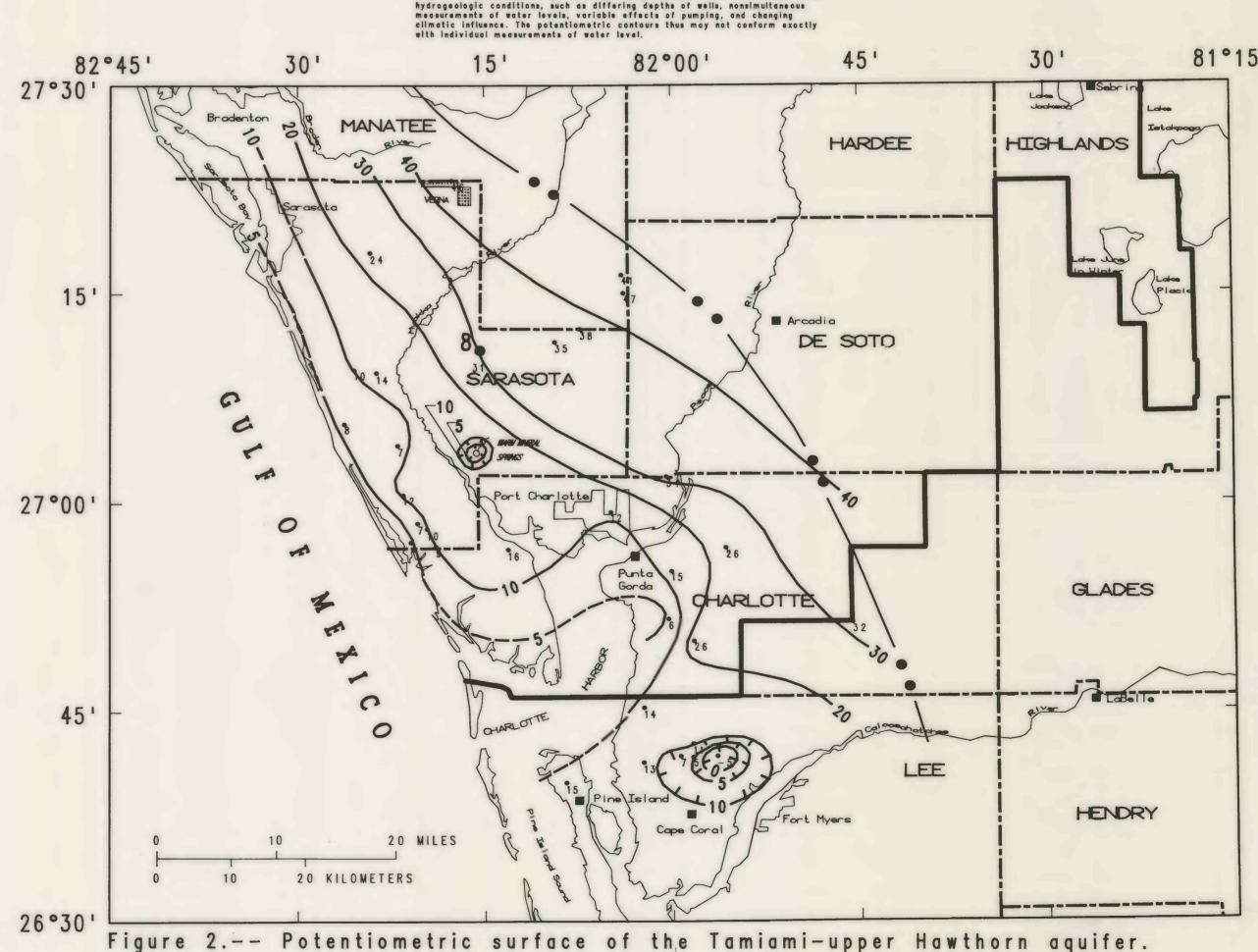


15'

Plant City

82°00'





Base from digital data (Lambert projection)
derived from U.S. Geological Survey State
base map of Florida 1:500,000, 1967
Digital data provided by Southwest Florida
Water Management District

Figure 3.--Water levels in selected wells for May and September 1982-1991.

POTENTIOMETRIC SURFACES OF THE INTERMEDIATE AQUIFER SYSTEM,
WEST-CENTRAL FLORIDA, SEPTEMBER 1991

Copies of this map can be purchased from:
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